

CLAIMS

1. A display panel, comprising: a backlight that supplies light used in displaying; a pixel-formed panel including a plurality of pixels arranged in matrix, a light shielding section that shields light emitted from the backlight, and an aperture section via which light emitted from the backlight transmits; and a microlens array including a plurality of microlenses each converging, to the aperture section light emitted from the backlight,

the microlens having a width, in a direction parallel to a display surface of the display panel, equal to a pixel pitch in the direction, and

the microlens being arranged to cause light that comes from the backlight and is incident on a top section of the microlens to transmit while maintaining substantially same intensity and direction.

2. The display panel according to Claim 1, wherein the microlens includes, at the top section of the microlens, a flat section that is substantially parallel to the display surface of the display panel.

3. The display panel according to Claim 1, further comprising an adhesive layer that is provided on a

backlight-side surface of the microlens array, and is provided so as to be in contact with the top section of the microlens by a predetermined width in the direction,

the adhesive layer being made of a material that causes a smaller difference in refractive index between the material and the microlens array than a difference in refractive index between air and the microlens.

4. The display panel according to Claim 1, wherein each of the plurality of pixels includes at least one sub-pixel, arranged vertically with respect to the direction, each including (a) a reflecting section that reflects light coming from a surrounding area of the display panel and (b) a transmitting section via which light, emitted from the backlight and having passed through the aperture section, transmits.

5. The display panel according to Claim 1, wherein an angle at which light emitted from the backlight is spread is less than or equal to 2.5 times a tolerable angle of the microlens.

6. The display panel according to Claim 4, wherein a section of the microlens, through which section light that comes from the backlight and is incident on the top section of

the microlens transmits while maintaining substantially same intensity and direction, is at least 0.2 times and is not more than, in width in the direction, the transmitting section of each of the at least one sub-pixel.

7. The display panel according to Claim 6, wherein:

the microlens includes, at the top section of the microlens, a flat section that is substantially parallel to the display surface of the display panel; and

the transmitting section of each of the at least one sub-pixel is 45% or below, in width in the direction, of the at least one sub-pixel.

8. The display panel according to Claim 4, wherein:

the direction is a row direction or a column direction, in which direction a distance between transmitting sections of adjacent ones of the plurality of pixels arranged in matrix is longer; and

the microlens array includes a plurality of lenticular lenses, arranged vertically with respect to the direction, that cause incident light to be converged in the direction.

9. The display panel according to Claim 4, wherein the microlens array includes a plurality of microlenses that are provided for respective one of the at least one sub-pixel, and

the microlens array causes incident light to be converged in a plurality of directions.

10. A method for manufacturing a display panel comprising: a backlight that supplies light used in displaying; a pixel-formed panel including a plurality of pixels arranged in matrix, a light shielding section that shields light emitted from the backlight, and an aperture section via which light emitted from the backlight transmits; and a microlens array including a plurality of microlenses each converging, to the aperture section light emitted from the backlight, the method comprising the steps of:

(i) forming a photopolymerizing polymer layer on a surface of the pixel-formed panel;

(ii) hardening a section of the photopolymerizing polymer layer by use of light that transmits through the aperture section; and

(iii) eliminating, after the step (ii), an unhardened portion of the photopolymerizing polymer layer so as to form the microlens.

11. The method according to Claim 10, wherein, in the step (i), a layer thickness of the photopolymerizing polymer layer is controlled to form the microlens in such a way that a width, in a direction parallel to a display surface of the

display panel, of the microlens is equal to a pixel pitch in the direction.

12. The method according to Claim 10, wherein, in the step (i), a layer thickness of the photopolymerizing polymer layer is controlled in such a way that, in the step (ii), a fixed amount of exposure is performed with respect to a section of the photopolymerizing polymer layer so that a microlens having a flat section is formed at a top section of the microlens.

13. The method according to Claim 12, wherein a layer thickness of the photopolymerizing polymer layer is controlled in such a way that the flat section is at least 0.2 times and is not more than, in width in a direction parallel to a display surface of the display panel, the aperture.

14. The method according to Claim 13, wherein the aperture section is 45% or below, in width in the direction, of an arrangement pitch of the aperture.

15. The method according to Claim 10, further comprising the step of forming an adhesive layer on a backlight-side surface of the microlens array in such a way that an area where the adhesive layer is in contact with a top

section of the microlens is at least 0.2 times and is not more than, in width in a direction parallel to a display surface of the display panel, the aperture section,

the adhesive layer being made of a material that causes a smaller difference in refractive index between the material and the microlens array than a difference in refractive index between air and the microlens.

16. The method according to Claim 10, wherein the step (ii) is performed by use of parallel light during exposure.